

**METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND
INSTALLATION THEREFOR**

Background of the Invention

5 ~~Subject of the invention~~ Field of the Invention

The present invention relates to a method for measuring the speed of a vehicle travelling on a track of railway type.

The present invention also relates to the installation for carrying out this method.

10 ~~Technical background of the invention~~ Description of the Related Art

Various systems for determining the speed of a train travelling on a track have already been proposed. In particular, it has been suggested to use a sensor present on an axle to determine the speed of the train travelling on the track. However, this speed is not always sufficiently precise, and in particular, it might not take account of a risk arising when the wheel skids for reasons such as the climatic conditions (frost or snow) or the presence of leaves on the rails.

It has also been proposed to place two or three sensors on different axles in order to obtain better precision. However, this remains insufficient from the point of view of the risk management.

20 It is also known practice to arrange beacons along railway tracks in order to measure the speed of the vehicle travelling on these tracks. In this case, beacons, which are arranged at known and fixed distances, emit a signal. The vehicle travelling close to this beacon detects, with the aid of an antenna, the passage over the first beacon and measures the time upto the passage of the second beacon. The speed is readily deduced from the known distance between the two beacons and the time taken by the vehicle to cover this distance. Nevertheless, the beacons are placed a relatively large distance apart and this amounts essentially to measuring the average speeds over the distance covered.

25 It has also been proposed in document WO97/12796 to use a calibrated beacon to determine the almost instantaneous speed of a vehicle passing in its vicinity. This beacon emits a magnetic field and, by means of an antenna placed under the vehicle, this vehicle can detect the entry into and exit from this field of magnetic influence. The

this vehicle can detect the entry into and exit from this field of magnetic influence. The time taken by the vehicle to cross the field of magnetic influence is deduced therefrom, and the speed of the vehicle is thus calculated. This method has the drawback of needing to place beacons at regular distances along the tracks.

5 Moreover, it is known practice to organize a track into track sections known as "block-sections", which are separated by electric joints. An electric joint consists of two tuning blocks acting as the power coupling for the track sections adjacent to each tuning block and for the short length of track located between these two tuning blocks (15 to 30 metres). Usually, the first tuning block acts as an emitter at a given frequency while the
10 second tuning block acts as a receiver at another frequency. The functions of the electric joint are, firstly, to prevent the propagation of the signal from one track circuit to the adjacent track circuit and, secondly, to couple the emitter and the receiver with the track.

 It is already known practice to use an electric joint to detect the passage of a
15 train. Actually, on passage of the train axles, a short-circuit is created between the two rails via the train axles and thus enables the detection of the position of said train relative to the emitter from the change of current in the track. Specifically, it is observed that the current at the F1 frequency in the rail in front of the axle is high before the axle passes at the level of the emitter connection, and undergoes a strong discontinuity at the
20 moment the axle passes.

 The document GB-A-2 153 571 describes an example of a track circuit assembly that is particularly suitable for a short track circuit of less than 40 m in length, which may be used in underground railway transit systems.

 It is mentioned therein that an electrical short-circuit is produced between the
25 rails and that an AC signal control unit is connected approximately 6 metres later so as to tune the loop thus formed to the resonance, to the frequency of the selected track signal. The control units comprise a capacitor, the value of which is chosen so as to adjust the resonance, and a transformer, one coil of which is mounted in series with the capacitor, a track circuit signal emitter or receiver being connected via a second coil of
30 the transformer.

Aims of the invention Summary of the Invention

The present invention aims to provide a solution which can offer the maximum security within the railway context of the term in measuring the speed of a vehicle travelling on a track of railway type.

5 More particularly, the present invention aims to propose a method which allows the average speed to be estimated independently of the error sources, due, for example, to skidding and to engagement of the axles, and which is based on the detection, when a train passes, of joints separating the various track circuits.

Main characteristic elements of the invention

10 The present invention aims to propose a system which can dispense with the installation of beacons along the tracks.

More particularly, the present invention aims to use already existing train-locating equipment which consists of track circuits with electric joints.

15 The present invention relates to a method for measuring the speed of a vehicle provided with an antenna and travelling on a track with two rails in the form of track sections known as "block-sections" separated by electric joints, each electric joint consisting of two tuning blocks and of the predetermined track section located between them, each of the tuning blocks allowing the power coupling for the adjacent track section acting as a block-section, characterized in that at least two discontinuities are
20 detected in the current or voltage of the signal as seen by an antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks of the same electric joint, in order to measure the speed of the vehicle travelling on the track.

25 The first discontinuity is obtained when the axle passes at the level of the first tuning block for the frequency of this first tuning block.

30 The second discontinuity is obtained by exerting an electrical action at the frequency of the first tuning block. This second discontinuity is obtained by creating an electric or magnetic field in the area of the second tuning block. This electric or magnetic field is generated by means of a current which is proportional to the current emitted by the voltage injected into the first tuning block. This field is generated directly by the current emitted by said voltage.

According to another embodiment, the electrical action is a voltage injected in series with the voltage at the second frequency of the second tuning block. This voltage injected in series is proportional to that which is injected into the first tuning block.

5 According to another embodiment, the electrical action is the injection of a current into a voltage generator which is present in the second tuning block, this current travelling round a loop arranged between the rails, said current being proportional to the current emitted by the voltage injected into the first tuning block.

The signal detected by the antenna which is on board the vehicle travelling on the track is filtered at the frequency of the voltage injected into the first tuning block.

10 The present invention also relates to an installation for carrying out the method as described above, in which the track is organized in the form of block-sections separated by electric joints, each electric joint consisting of at least two tuning blocks and of the short track section located between them. This installation comprises means for generating at least two current or voltage discontinuities in the signal as seen by the
15 antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks of the same electric joint.

Brief description of the figures Drawings

Figure 1 represents the electric diagram equivalent of an electric joint.

20 Figure 2 represents the equivalent diagram of a track circuit between two electric joints as described in Figure 1.

Figure 3 indicates the effect of the axles on the current in the rails in front of the axles before the axle passes.

25 Figure 4 indicates the effect of the axles on the current in the rails after the axle passes.

Figure 5 represents the diagram of the current in the rails in front of the axles according to the prior art.

Figures 6, 7 and 8 represent several different embodiments of the invention.

30 Figure 9 represents the diagram of the current in the rails in front of the axle according to the invention.

Detailed Description of the Preferred Embodiment of the invention

An electric joint as represented in Figure 1 comprises a first tuning block TU.F1 located on a first side (left), which will serve as an emitter in order to generate a voltage in the track at the frequency F1 and allows the power coupling of this first side (left) of the track adjacent to the tuning block. A second tuning block TU.F3, located at a distance of 15 to 30 metres, allows the power coupling of the other part of the track (right) adjacent to this tuning block. This second tuning block serves as a receiver for a frequency F3. It might optionally also act as an emitter, which would allow a voltage to be generated at the frequency F3.

Figure 2 represents a track circuit comprising several track sections organized into block-sections and separated by electric joints, each consisting of two tuning blocks coupled in pairs. For a frequency F1, the two tuning blocks TU.F1 and TU.F1' are equivalent to a capacity which performs the tuning of the track section (block-section 1) comprised between these two blocks, while the two tuning blocks TU.F3 and TU.F3' are equivalent to short-circuits at this same frequency (F1). At the frequency (F3) of the adjacent track circuits, the function of the tuning blocks is then inverted.

As represented in Figures 3 and 4, a shunt or short-circuit is created between the rails 1 and 2 when the axle 3 passes. More specifically, the behaviour of the current I generated at the frequency F1 and present in the track 1 in front of the axle 3 is modified.

As shown in Figure 5, it is observed that the current I at the frequency F1 remains high up to the moment at which the axle approaches the emitter TU.F1 which generates the signal at the frequency F1. At the level of said emitter, it is observed that the current I at the frequency F1 falls suddenly, creating a first discontinuity 7 at that point. Figure 5 shows in details the behaviour of the current I in front of the axle, taking into account the position of the emitter TU.F1 on the x-axis -18 m serving as reference, whereas TU.F3 ~~serves as the reference (0)~~ is situated at 18m.

The present invention consists in creating a second discontinuity 8U in the immediate vicinity of the second tuning block TU.F3 and in using these two discontinuities occurring at a known distance in order to be able to calculate the average

speed of the train between the two positions at which said discontinuities occur.

To this end, it is envisaged to detect on board the train a signal resulting from the magnetic field generated by the current I. More specifically, the voltage V obtained by filtering the antenna signals in a known manner will be proportional to the current I present in the rails in front of the axle 3. This signal is caught by at least one antenna of known type arranged upstream the first axle 3. The signal is filtered at the frequency F1 in order to allow the detection of the two discontinuities 7 and 8 of the current I. One or more other signals at the frequency F3 or at other frequencies may also be used for detecting other pairs of discontinuities occurring on other track circuits.

According to a first embodiment of the present invention, which is more particularly represented in Figure 6, it is suggested to arrange a loop 4 between the rails 1 and 2 close to the block TU.F3 acting as receiver and equivalent to a short-circuit at the frequency F3. This loop 4 is supplied with a current at the frequency F1 which is preferably proportional to the current in the block TU.F1. It is preferably connected in series with this block. Advantageously, the magnetic field generated by the loop 4 creates the second discontinuity 8 required to carry out the method according to the present invention. According to another preferred embodiment of the invention, which is more particularly represented in Figure 7, it is proposed to connect a voltage generator 5 at the frequency F1 in series with the block TU.F3. In this case, the block TU.F3 is equivalent to a short-circuit for the frequency F1. The generator 5 is preferably supplied from the power supply for the block TU.F1.

The second discontinuity 8 will be obtained during passage at the block TU.F3 ($x\text{-axis} = 0.18\text{m}$), the voltage being proportional to that of the block TU.F1 (emitter at the frequency F1).

According to another embodiment, represented in Figure 8, a current generator 6 is connected in parallel to the terminals of the block TU.F3. The current thus generated travels round the loop 9 arranged between the two rails 1 and 2, thus creating a magnetic field that is detectable at that point. The generator 6 at the frequency F1 is advantageously arranged in series with the block TU.F1 and thus creates the second desired discontinuity 8.

Figure 9 shows the current I as a function of the distance travelled on the rails by

positioning the block TU.F1 creating the first discontinuity at ~~-18 m~~ 0 and the block TU.F3 creating the second discontinuity at ~~the point 0~~ 18m. One may detect a signal on board by filtering the antenna signals at the frequency F1 and detect the presence of the two discontinuities 7 and 8 whose descending slopes are linked to the precise position of the blocks TU.F1 and TU.F3.

Conventionally, the detection of these two detected discontinuities will be processed using a microprocessor, which makes it possible to define the time interval between the detection of said discontinuities. Conventionally, knowledge of the precise distance between the blocks TU.F1 and TU.F3 will make it possible to calculate the average speed of the vehicle travelling on said track between the two blocks TU.F1 and TU.F3.

In a particularly advantageous manner, it is observed that the cost of installation of the additional device is relatively low and thus makes it possible to obtain a relatively precise measurement of the speed of the train travelling on a track. In addition, the measurement of this speed remains independent of the precise positioning of beacons, for example, the movement of which might occur in the event of maintenance work on the track, climatic phenomena, skidding of the wheels, etc.

METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR

Abstract of the Disclosure

5 In order to measure a speed of a vehicle having an antenna and travelling on a
track formed by two rails, first and second discontinuities are detected. The first
discontinuity is detected in a current or voltage of a signal generated by an antenna
when the vehicle passes a first tuning block of an electric joint. The second
discontinuity is detected in a current or voltage of a signal generated by the antenna
when the vehicle passes a second tuning block of the electric joint. The detected
10 discontinuities are used to measure the speed of the vehicle travelling on a track divided
in track sections separated by electric joints. Each electric joint includes two tuning
blocks and a predetermined length of a track section, wherein each of the tuning blocks
allows power coupling between adjacent track sections.

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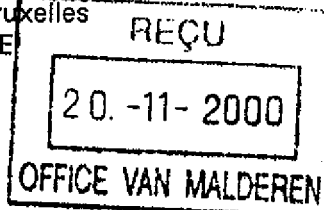
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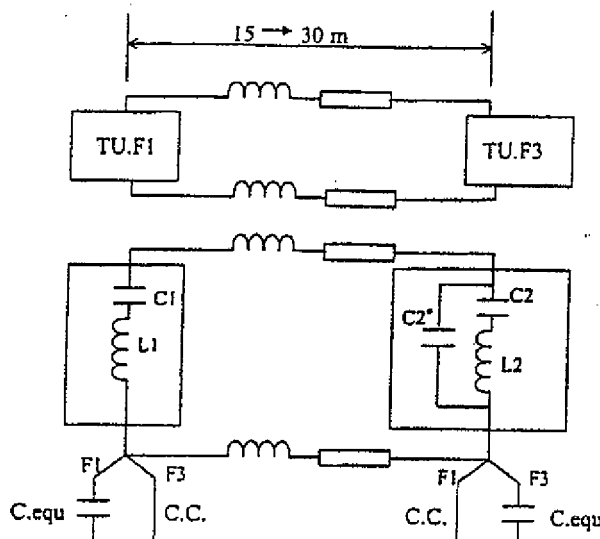
(54) Titre: PROCEDE DE MESURE DE LA VITESSE D'UN VEHICULE SUR RAILS ET INSTALLATION DESTINEE A CET EFFET

(57) Abstract

The invention relates to a method for measuring the speed of a vehicle fitted with an antenna and travelling on a track with two rails in the form of track sections (1, 2, 3), known as block systems which are separated by electric joints, whereby each electric joint is made up of two tuning blocks (TU.F1 and TU.F3) and a predetermined track section located therebetween, whereby power coupling is provided for the adjacent track section acting as a block system by each of the tuning blocks (TU.F1 and TU.F3). The invention is characterized by detection of at least two discontinuities in the current or in the voltage of the signal as seen by an antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks (TU.F1 and TU.F3) of the same electric joint in order to measure the speed of the vehicle travelling on said track. The invention also relates to an installation for carrying out the inventive method.

(57) **Abbrégé**

La présente invention se rapporte à un procédé de mesure de la vitesse d'un véhicule muni d'une antenne et circulant sur une voie à deux rails se présentant sous la forme de sections de voie appelées "cantonnements" (1, 2, 3) séparées par des joints électriques, chaque joint électrique étant constitué de deux blocs d'accord (TU.F1 et TU.F3) et de la section de voie prédéterminée située entre eux, chacun des blocs d'accord permettant le couplage en énergie pour la section de voie adjacente servant de cantonnement, caractérisé en ce que l'on détecte au moins deux discontinuités en courant ou en tension du signal vu par une antenne présente dans le véhicule circulant sur la voie aux abords des régions des premier et second blocs d'accord (TU.F1 et TU.F3) d'un même joint électrique, en vue de mesurer la vitesse du véhicule circulant sur la voie. La présente invention se rapporte également à l'installation pour la mise en oeuvre de ce procédé.





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WHEREAS, WE (1) Eric Lechevin, a Belgian citizen, residing at Chemin de Motte à Faulx 3c, B-7900 Leuze-en-Hainaut, Belgium; (2) Jean-Pierre Franckart, a Belgian citizen, residing at Chaussée de Charleroi 76, B-6060 Montignies-sur-Sambre, Belgium; and (3) Danièle Galardini, a Belgian citizen, residing at Avenue Jules Destrée 62, B-6031 Monceau-sur-Sambre, Belgium hereinafter referred to as Assignor (collectively if more than one inventor is listed above), have invented certain new and useful improvements in METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR, the specification of which:

- (a) was executed on even date herewith;
- (b) ☒ was filed on October 29, 2001 as ☒ Application No 10 / 031,274 or ☐ Express Mail No., as Application No. not yet known _____ and was amended on _____ (if applicable); or
- (c) ☒ was described and claimed in PCT International Application No. PCT/BE00/00043 filed on April 20, 2000.

AND WHEREAS, ALSTOM BELGIUM S.A., with its principal place of business at Rue Cambier Dupret 50-52, B-6001 Charleroi, Belgium (hereinafter referred to as Assignee) desires to acquire the entire right, title, and interest in and to the said improvements with respect to the United States of America, its territories and possessions.

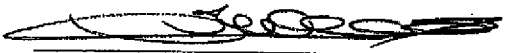
NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby acknowledges that it has sold, assigned, transferred and set over, and by these presents does hereby sell, assign, transfer and set over, unto Assignee, its successors, legal representatives and assigns, the entire right, title, and interest in the United States of America, and its territories and possessions in, to and under said improvements, and any Patent Applications in the United States of America and all divisions, renewals and continuations thereof, and all Patents of the United States of America which may be granted thereon and all reissues and extensions thereof, and all rights of priority under International Conventions; and Assignor hereby authorizes and requests the Commissioner of Patents of the United States of America to issue all Patents for said improvements to Assignee, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND ASSIGNOR HEREBY covenants and agrees that it will communicate to Assignee, its successors, legal representatives and assigns, any facts known to it respecting said improvements, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing and reissue applications, make all rightful oaths and generally do everything possible to aid Assignee, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for said improvements in the United States of America.

IN TESTIMONY WHEREOF, Assignor intending to be legally bound has hereunto affixed its signature.

This 5th day of December, 2001


Signature of Eric Lechevin


Signature of witness VAN MALDEREN Joëlle

This 5th day of December, 2001


Signature of Jean-Pierre Franckart


Signature of witness CHARON Claude

WHEREAS, WE (1) Eric Lechevin, a Belgian citizen, residing at Chemin de Motte à Faulx 3c, B-7900 Leuze-en-Hainaut, Belgium; (2) Jean-Pierre Franckart, a Belgian citizen, residing at Chaussée de Charleroi 76, B-6060 Montignies-sur-Sambre, Belgium; and (3) Danièle Galardini, a Belgian citizen, residing at Avenue Jules Destrée 62, B-6031 Monceau-sur-Sambre, Belgium hereinafter referred to as Assignor (collectively if more than one inventor is listed above), have invented certain new and useful improvements in METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR, the specification of which:

- (a) was executed on even date herewith;
- (b) ☒ was filed on October 29, 2001 as ☒ Application No. 10/031,274 or ☐ Express Mail No., as Application No. not yet known _____ and was amended on _____ (if applicable); or
- (c) ☒ was described and claimed in PCT International Application No. PCT/BE00/00043 filed on April 20, 2000.

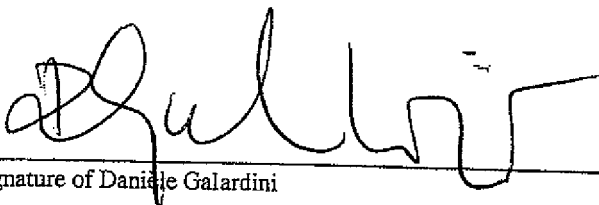
AND WHEREAS, ALSTOM BELGIUM S.A., with its principal place of business at Rue Cambier Dupret 50-S2, B-6001 Charleroi, Belgium (hereinafter referred to as Assignee) desires to acquire the entire right, title, and interest in and to the said improvements with respect to the United States of America, its territories and possessions.


NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby acknowledges that it has sold, assigned, transferred and set over, and by these presents does hereby sell, assign, transfer and set over, unto Assignee, its successors, legal representatives and assigns, the entire right, title, and interest in the United States of America, and its territories and possessions in, to and under said improvements, and any Patent Applications in the United States of America and all divisions, renewals and continuations thereof, and all Patents of the United States of America which may be granted thereon and all reissues and extensions thereof, and all rights of priority under International Conventions; and Assignor hereby authorizes and requests the Commissioner of Patents of the United States of America to issue all Patents for said improvements to Assignee, its successors, legal representatives and assigns, in accordance with the terms of this instrument:

AND ASSIGNOR HEREBY covenants and agrees that it will communicate to Assignee, its successors, legal representatives and assigns, any facts known to it respecting said improvements, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing and reissue applications, make all rightful oaths and generally do everything possible to aid Assignee, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for said improvements in the United States of America.

IN TESTIMONY WHEREOF, Assignor intending to be legally bound has hereunto affixed its signature.

This 5th day of December, 2001


Signature of Danièle Galardini


Signature of witness CHARON Claude



UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	DRAWINGS	TOT CLAIMS	IND CLAIMS
10/031,274	06/11/2002	3613	1020	VANM235.001APC		17	2

20995

KNOBBE MARTENS OLSON & BEAR LLP
620 NEWPORT CENTER DRIVE
SIXTEENTH FLOOR
NEWPORT BEACH, CA 92660

CONFIRMATION NO. 4287

FILING RECEIPT



OC000000008488125

Date Mailed: 07/23/2002

Receipt is acknowledged of this nonprovisional Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please write to the Office of Initial Patent Examination's Filing Receipt Corrections, facsimile number 703-746-9195. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

Eric Lechevin, Leuze-En-Hainaut, BELGIUM;
Jean-Pierre Franckart, Montignies-Sur Sambre, BELGIUM;
Daniele Galardini, Monceau-Sur-Sambre, BELGIUM;

Domestic Priority data as claimed by applicant

THIS APPLICATION IS A 371 OF PCT/BE00/00043 04/20/2000

Foreign Applications

EUROPEAN PATENT OFFICE (EPO) 99870079.3 04/30/1999

Projected Publication Date: Not Applicable, filed prior to November 29, 2000

Non-Publication Request: No

Early Publication Request: No

Title

Method for measuring the speed of a rail vehicle and installation therefor

Preliminary Class

**LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15**

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Office of Export Administration, Department of Commerce (15 CFR 370.10 (j)); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents, Box PCT
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/031,274	Eric Lechevin	VANM235.001APC

INTERNATIONAL APPLICATION NO.

PCT/BE00/00043

I.A. FILING DATE

04/20/2000

PRIORITY DATE

04/30/1999

20995

KNOBBE MARTENS OLSON & BEAR LLP
620 NEWPORT CENTER DRIVE
SIXTEENTH FLOOR
NEWPORT BEACH, CA 92660

CONFIRMATION NO. 4287

371 ACCEPTANCE LETTER



OC00000008488126

Date Mailed: 07/23/2002

**NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.494
OR 1.495**

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as an Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

06/11/2002

DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and
(c)(4) REQUIREMENTS

06/11/2002

DATE OF RECEIPT OF ALL 35 U.S.C.
REQUIREMENTS

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- U.S. Basic National Fee
- Copy of IPE Report
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- English Translation of the IA
- Information Disclosure Statements
- Oath or Declaration
- Preliminary Amendments

- Request for Immediate Examination
- Substitute Specification

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

CHARITTA A BURT

Telephone: (703) 305-3734

PART 1 - ATTORNEY/APPLICANT COPY

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Date: June 7, 2002

Page 1

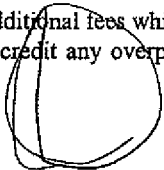
**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC 371**

International Application No.: PCT/BE00/00043
International Filing Date: April 20, 2000
Priority Date Claimed: April 30, 1999
Title of Invention: METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND
INSTALLATION THEREFOR
Applicants for DO/EO/US: Lechevin, et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- (X) This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
- (X) Copy of Notification of Missing Requirements Under 35 U.S.C. 371 In The United States Designated/Elected Office (DO/EO/US) dated April 11, 2002.
- (X) An oath or declaration of the inventors (35 USC 371(c)(4)).
- (X) A Power of Attorney and copy of the Assignment.
- (X) The fee of \$130 for submission of the Declaration after 30 months from the priority under 37 C.F.R. 1.492(e).
- (X) A return prepaid postcard.
- (X) A check in the amount of \$130 to cover the above fees is enclosed.
- (X) The Commissioner is hereby authorized to charge only those additional fees which may be required, now or in the future, to avoid abandonment of the application, or credit any overpayment to Deposit Account No. 11-1410.

SEND ALL CORRESPONDENCE TO:



John M. Carson
Reg. No. 34,303
Customer No. 20,995



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents, Box PCT
United States Patent and Trademark Office
Washington, D.C. 20231
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED APPLICANT	ATTY. DOCKET NO.
10/031,274	Eric Lechevin	VANM235.001APC

20995
KNOBBE MARTENS OLSON & BEAR LLP
620 NEWPORT CENTER DRIVE
SIXTEENTH FLOOR
NEWPORT BEACH, CA 92660

INTERNATIONAL APPLICATION NO.

PCT/BE00/00043

IA. FILING DATE	PRIORITY DATE
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04/20/2000

04/30/1999

CONFIRMATION NO. 4287

371 FORMALITIES LETTER



OC000000007834882

Date Mailed: 04/11/2002

NOTIFICATION OF MISSING REQUIREMENTS UNDER 35 U.S.C. 371 IN THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

The following items have been submitted by the applicant or the IB to the United States Patent and Trademark Office as an Elected Office (37 CFR 1.495):

- U.S. Basic National Fees
- Priority Document
- Copy of IPE Report
- Copy of references cited in ISR
- Copy of the International Application
- Copy of the International Search Report
- English Translation of the IA
- Information Disclosure Statements
- Preliminary Amendments
- Request for Immediate Examination
- Substitute Specification

The following items **MUST** be furnished within the period set forth below in order to complete the requirements for acceptance under 35 U.S.C. 371:

- Oath or declaration of the inventors, in compliance with 37 CFR 1.497(a) and (b), identifying the application by the International application number and international filing date.
- \$130 Surcharge for providing the oath or declaration later than the appropriate 30 months months from the priority date (37 CFR 1.492(e)) is required.

ALL OF THE ITEMS SET FORTH ABOVE MUST BE SUBMITTED WITHIN TWO (2) MONTH FROM THE DATE OF THIS NOTICE OR BY 22 or 32 MONTHS (where 37 CFR 1.495 applies) FROM THE PRIORITY DATE FOR THE APPLICATION, WHICHEVER IS LATER. FAILURE TO PROPERLY RESPOND WILL RESULT IN ABANDONMENT.

The time period set above may be extended by filing a petition and fee for extension of time under the provisions of 37 CFR 1.136(a).

SUMMARY OF FEES DUE:

Total additional fees required for this application is **\$130** for a Large Entity:

- **\$130** Late oath or declaration Surcharge.

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

*A copy of this notice **MUST** be returned with the response.*

CHARITTA A BURT

Telephone: (703) 305-3734

PART 1 - ATTORNEY/APPLICANT COPY

U.S. APPLICATION NUMBER NO.	INTERNATIONAL APPLICATION NO.	ATTY. DOCKET NO.
10/031,274	PCT/BE00/00043	VANM235.001APC

FORM PCT/DO/EO/905 (371 Formalities Notice)

Declaration and Power of Attorney for Patent Application

Déclaration et Pouvoirs pour demandes de brevet

French Language Declaration

En tant que l'inventeur nommé ci-après, je déclare par le présent acte que :

Mon domicile, mon adresse postale et ma nationalité figurant ci-dessous à côté de mon nom,

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) du sujet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention intitulée :

As a below named inventor, I hereby declare that :

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled :

et dont les caractéristiques sont fournies ci-joint à moins que la case suivante n'ait été cochée :

- ☐ a été déposé le
sous le numéro de Demande des Etats-Unis ou
sous le numéro de demande internationale
PCT et modifiée le
(le cas échéant).

the specification of which is attached hereto unless the following box is checked :

- ☒ was filed on 20 April 2000
as United States Application Number or PCT
International Application Number
PCT/BE00/00043 and was amended on
(if applicable).

Je déclare par le présent acte avoir passé en revue et pris connaissance du contenu des caractéristiques ci-dessus, revendications comprises, telles que modifiées par tout amendement dont il aura été fait référence ci-dessus.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

Je reconnais de voir divulguer toute information pertinente à l'examen de cette demande, comme le définit le Titre 37, §1.56 du Code fédéral des réglementations.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

French Language Declaration

Je revendique par le présent acte avoir la priorité étrangère, en vertu du Titre 35, § 119 du Code des Etats-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur figurant ci-dessous et ai aussi pris connaissance de toute demande étrangère de brevet ou de tout certificat d'inventeur ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée.

Prior foreign applications

Demande(s) de brevet antérieure(s)

EP 99870079.3 EP
(Number) (Country)
(Numéro) (Pays)

(Number) (Country)
(Numéro) (Pays)

(Number) (Country)
(Numéro) (Pays)

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 120 du Code des Etats-Unis, de toute demande de brevet effectuée aux Etats-Unis figurant ci-dessous et, dans la mesure où le sujet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande américaine préalable, en vertu des dispositions de premier paragraphe du Titre 35, § 112 du Code des Etats-Unis, je reconnais devoir divulguer toute information pertinente à la demande de brevet comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la première demande et la date de dépôt de la demande nationale ou PCT internationale :

(Application Serial No.) (Filing date)
(No. de série de la demande) (Date de dépôt)

(Application Serial No.) (Filing date)
(No. de série de la demande) (Date de dépôt)

Je déclare par le présent acte que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique; et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des Etats-Unis et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci.

I hereby claim foreign priority under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Priority claimed
Droit de priorité revendiqué

30 April 1999	<input checked="" type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non
	<input type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non
	<input type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application :

(Statut) (Status)
(Breveté, en attente, annulé) (Patented, pending, abandoned)

(Statut) (Status)
(Breveté, en attente, annulé) (Patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful and false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.

French Language Declaration

POUVOIRS : En tant que l'inventeur cité, je désigne par la présente l'(les) avocat(s) et/ou agent(s) suivant(s) pour qu'il(s) poursuive(nt) la procédure de cette demande de brevet et traite(nt) toute affaire avec le Bureau des brevets et marques s'y rapportant.

(mentionner le nom et le numéro d'enregistrement)

POWER OF ATTORNEY : As named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and trademark Office connected there with.

(list name and registration number)

Adresser toute correspondance à :

Send Correspondence to :

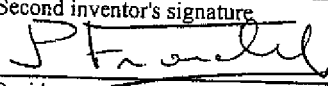
Adresser tout appel téléphonique à :
(nom et numéro de téléphone)

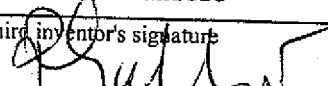
Direct Telephone Calls to :
(name and telephone number)

Nom complet de l'unique ou premier inventeur	Full name of sole or first inventor LECHEVIN Eric
Signature de l'inventeur	Inventor's signature
Date	Date - 5 DEC. 2002
Domicile	Residence Chemin de Motte à Faulx 3c, B-7900 LEUZE-EN-HAINAUT (Belgium)
Nationalité	Citizenship Belgian citizen
Adresse postale	Post Office Address Chemin de Motte à Faulx 3c, B-7900 LEUZE-EN-HAINAUT (Belgium)

(Fournir les mêmes renseignements et la signature de tout co-inventeur supplémentaire)

(Supply similar information and signature for any subsequent joint inventor)

Nom complet du second co-inventeur, le cas échéant	Full name of second joint inventor, if any FRANCKART Jean-Pierre
Signature du second inventeur	Second inventor's signature  Date - 5 DEC. 2001
Domicile	Residence Chaussée de Charleroi 76, B-6060 MONTIGNIES-SUR-SAMBRE (Belgium)
Nationalité	Citizenship Belgian citizen
Adresse postale	Post Office Address Chaussée de Charleroi 76, B-6060 MONTIGNIES-SUR-SAMBRE (Belgium)

Nom complet du troisième co-inventeur, le cas échéant	Full name of third joint inventor, if any GALARDINI Danièle
Signature du troisième inventeur	Third inventor's signature  Date - 5 DEC. 2001
Domicile	Residence Avenue Jules Destrée 62, B-6031 MONCEAU-SUR-SAMBRE (Belgium)
Nationalité	Citizenship Belgian citizen
Adresse postale	Post Office Address Avenue Jules Destrée 62, B-6031 MONCEAU-SUR-SAMBRE (Belgium)

Nom complet du quatrième co-inventeur, le cas échéant	Full name of fourth joint inventor, if any
Signature du quatrième inventeur	Fourth inventor's signature
Domicile	Residence
Nationalité	Citizenship
Adresse postale	Post Office Address

**ESTABLISHMENT OF RIGHT OF ASSIGNEE TO TAKE ACTION
AND
REVOCATION AND POWER OF ATTORNEY**

To the Commissioner of Patents and Trademarks:

The undersigned is empowered to act on behalf of the assignee indicated below (the "Assignee"). The original assignment of the attached application for Letters Patent for the invention in **METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR** from the inventors to the Assignee is being submitted herewith for recordation by the Assignment Branch. A true copy of this Assignment is attached hereto. This Assignment represents the entire chain of title of this invention from the Inventors to the Assignee. I have reviewed this Assignment, and to the best of the Assignee's knowledge and belief, the Assignee is the owner of the entire right, title, and interest in the above-referenced application.

I declare that all statements made herein of my own knowledge are true, and that all statements made upon information and belief are believed to be true, and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001, and that willful, false statements may jeopardize the validity of the application, or any patent issuing thereon.

The undersigned hereby revokes any previous powers of attorney in the subject application, and hereby appoints the registrants of Knobbe, Martens, Olson & Bear, LLP, 620 Newport Center Drive, Sixteenth Floor, Newport Beach, California 92660, Telephone (949) 760-0404, **Customer No. 20,995**, as its attorneys with full power of substitution and revocation to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected herewith. This appointment is to be to the exclusion of the inventor(s) and his attorney(s) in accordance with the provisions of 37 C.F.R. § 3.71.

Please use **Customer No. 20,995** for all communications.

Assignee: ALSTOM BELGIUM S.A.

By: 
D. HAUSMAN
Title: Managing Director

Address: Rue Cambier Dupret 50-52
B-6001 Charleroi
Belgium

Dated: 5 of DECEMBER 2001

H:\DOCS\MOHMOH-6118.DOC:ad
100501

ASSIGNMENT

WHEREAS, WE (1) Eric Lechevin, a Belgian citizen, residing at Chemin de Motte à Faulx 3c, B-7900 Leuze-en-Hainaut, Belgium; (2) Jean-Pierre Franckart, a Belgian citizen, residing at Chaussée de Charleroi 76, B-6060 Montignies-sur-Sambre, Belgium; and (3) Danièle Galardini, a Belgian citizen, residing at Avenue Jules Destrée 62, B-6031 Monceau-sur-Sambre, Belgium hereinafter referred to as Assignor (collectively if more than one inventor is listed above), have invented certain new and useful improvements in METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR, the specification of which:

- (a) was executed on even date herewith;
- (b) ☒ was filed on October 29, 2001 as ☒ Application No 10/031,274 or ☐ Express Mail No., as Application No. not yet known _____ and was amended on _____ (if applicable); or
- (c) ☒ was described and claimed in PCT International Application No. PCT/BE00/00043 filed on April 20, 2000.

AND WHEREAS, ALSTOM BELGIUM S.A., with its principal place of business at Rue Cambier Dupret 50-52, B-6001 Charleroi, Belgium (hereinafter referred to as Assignee) desires to acquire the entire right, title, and interest in and to the said improvements with respect to the United States of America, its territories and possessions.

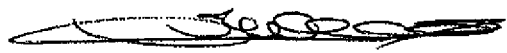
NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby acknowledges that it has sold, assigned, transferred and set over, and by these presents does hereby sell, assign, transfer and set over, unto Assignee, its successors, legal representatives and assigns, the entire right, title, and interest in the United States of America, and its territories and possessions in, to and under said improvements, and any Patent Applications in the United States of America and all divisions, renewals and continuations thereof, and all Patents of the United States of America which may be granted thereon and all reissues and extensions thereof, and all rights of priority under International Conventions; and Assignor hereby authorizes and requests the Commissioner of Patents of the United States of America to issue all Patents for said improvements to Assignee, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND ASSIGNOR HEREBY covenants and agrees that it will communicate to Assignee, its successors, legal representatives and assigns, any facts known to it respecting said improvements, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing and reissue applications, make all rightful oaths and generally do everything possible to aid Assignee, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for said improvements in the United States of America.

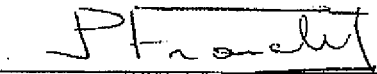
IN TESTIMONY WHEREOF, Assignor intending to be legally bound has hereunto affixed its signature.

This 5th day of December, 2001


Signature of Eric Lechevin


Signature of witness VAN MALDEREN Joëlle

This 5th day of December, 2001


Signature of Jean-Pierre Franckart


Signature of witness CHARON Claude

WHEREAS, WE (1) Eric Lechevin, a Belgian citizen, residing at Chemin de Motte à Faulx 3c, B-7900 Leuze-en-Hainaut, Belgium; (2) Jean-Pierre Franckart, a Belgian citizen, residing at Chaussée de Charleroi 76, B-6060 Montignies-sur-Sambre, Belgium; and (3) Danièle Galardini, a Belgian citizen, residing at Avenue Jules Destrée 62, B-6031 Monceau-sur-Sambre, Belgium hereinafter referred to as Assignor (collectively if more than one inventor is listed above), have invented certain new and useful improvements in METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR, the specification of which:

- (a) was executed on even date herewith;
- (b) ☒ was filed on October 29, 2001 as ☒ Application No. 10/031,274 or ☐ Express Mail No., as Application No. not yet known _____ and was amended on _____ (if applicable); or
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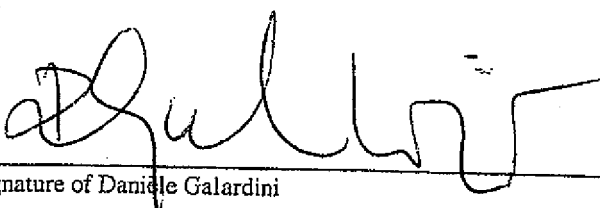
AND WHEREAS, ALSTOM BELGIUM S.A., with its principal place of business at Rue Cambier Dupret 50-52, B-6001 Charleroi, Belgium (hereinafter referred to as Assignee) desires to acquire the entire right, title, and interest in and to the said improvements with respect to the United States of America, its territories and possessions.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, Assignor hereby acknowledges that it has sold, assigned, transferred and set over, and by these presents does hereby sell, assign, transfer and set over, unto Assignee, its successors, legal representatives and assigns, the entire right, title, and interest in the United States of America, and its territories and possessions in, to and under said improvements, and any Patent Applications in the United States of America and all divisions, renewals and continuations thereof, and all Patents of the United States of America which may be granted thereon and all reissues and extensions thereof, and all rights of priority under International Conventions; and Assignor hereby authorizes and requests the Commissioner of Patents of the United States of America to issue all Patents for said improvements to Assignee, its successors, legal representatives and assigns, in accordance with the terms of this instrument.

AND ASSIGNOR HEREBY covenants and agrees that it will communicate to Assignee, its successors, legal representatives and assigns, any facts known to it respecting said improvements, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuing and reissue applications, make all rightful oaths and generally do everything possible to aid Assignee, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for said improvements in the United States of America.

IN TESTIMONY WHEREOF, Assignor intending to be legally bound has hereunto affixed its signature.

This 5th day of December, 2001


Signature of Danièle Galardini


Signature of witness CHARON Claude

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Lechevin, et al.)	Group Art Unit Unknown
)	
App. No.	:	Unknown)	
)	
Filed	:	Herewith)	
)	
For	:	METHOD FOR MEASURING)	
		THE SPEED OF A RAIL)	
		VEHICLE AND)	
		INSTALLATION THEREFOR)	
)	
Examiner	:	Unknown)	

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Enclosed is form PTO-1449 listing references that are also enclosed. This Information Disclosure Statement is being filed within three months of the filing date of this application or upon filing if this is a CPA or RCE, and no fee is required in accordance with 37 C.F.R. § 1.97(b)(1), (b)(2), or (b)(4). The enclosed references were cited in the International Search Report and categorized as background art.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 10/29/01

By: 

John M. Carson
Registration No. 34,303
Attorney of Record
620 Newport Center Drive
Sixteenth Floor
Newport Beach, CA 92660
(619) 235-8550

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE INFORMATION DISCLOSURE STATEMENT BY APPLICANT (USE SEVERAL SHEETS IF NECESSARY)	ATTY. DOCKET NO. VANM235.001APC	APPLICATION NO. Unknown
	APPLICANT Lechevin, et al.	
	FILING DATE Herewith	GROUP Unknown

U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)

FOREIGN PATENT DOCUMENTS								
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION	
							YES	NO
		2 153 571	8/21/85	United Kingdom				
		WO 97/12796 (with English abstract)	4/10/97	PCT				X

EXAMINER INITIAL	OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)	

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EXAMINER	DATE CONSIDERED
*EXAMINER: INITIAL IF CITATION CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP 609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED, INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.	

U.S. Application No.
Unknown

International Application No.
PCT/BE00/00043

10/031274

Attorney Docket No.
VANM235.001APC

Date: October 29, 2001

JC10 Rec'd PCT/PTO 29 OCT 2001
Page 1

**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC 371**

International Application No.: PCT/BE00/00043
International Filing Date: April 20, 2000
Priority Date Claimed: April 30, 1999
Title of Invention: METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND
INSTALLATION THEREFOR
Applicant(s) for DO/EO/US: Eric Lechevin, Jean-Pierre Franckart and Danièle Galardini

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

- ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
- ☒ This express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 371(b) and PCT Articles 22 and 39(1).
- ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
- ☒ A copy of the International Application as filed (35 USC 371(c)(2))
 - a) ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b) ☒ has been transmitted by the International Bureau.
 - c) ☒ a copy of Form PCT/IB/308 is enclosed.
 - d) ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
- ☒ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3))
 - e) ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - f) ☐ have been transmitted by the International Bureau.
 - g) ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - h) ☒ have not been made and will not be made.
- ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98 with PTO-1449 and two (2) references.
- ☒ A FIRST preliminary amendment.
- ☒ A substitute specification under 37 C.F.R. 1.125(b)(2) is enclosed.
- ☒ A marked up copy of the specification showing the changes to the specification is enclosed.
- ☒ International Application as published (cover sheet only).
- ☒ A return prepaid postcard.
- ☒ The following fees are submitted:

U.S. Application No.
Unknown

International Application No.
PCT/BE00/00043

Date: October 29, 2001

10/031274
Attorney Docket No.
VANM235.001APC
531 Rec'd PCT/PIC 29 OCT 2001
Page 2

				FEES
BASIC FEE				\$890
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total Claims	17 - 20 =	0 x	\$18	\$0
Independent Claims	2 - 3 =	0 x	\$84	\$0
Multiple dependent claims(s) (if applicable)			\$280	\$0
TOTAL OF ABOVE CALCULATIONS				\$890
Reduction by 1/2 for filing by small entity (if applicable).			\$0	
TOTAL NATIONAL FEE				\$890
TOTAL FEES ENCLOSED				\$890

- (X) The fee for later submission of the signed oath or declaration set forth in 37 CFR 1.492(e) will be paid upon submission of the declaration.
- (X) A check in the amount of \$890 to cover the above fees is enclosed.
- (X) The Commissioner is hereby authorized to charge only those additional fees which may be required, now or in the future, to avoid abandonment of the application, or credit any overpayment to Deposit Account No. 11-1410.

SEND ALL CORRESPONDENCE TO:

John M. Carson
Reg. No. 34,303
Customer No. 20,995

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531 Rec'd PCT/PT. 29 OCT 2001
PATENT

VANM235.001APC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Lechevin, et al.)	Group Art Unit Unknown
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Appl. No.	:	Unknown)	
)	
Filed	:	Herewith)	
)	
For	:	METHOD FOR MEASURING)	
		THE SPEED OF A RAIL)	
		VEHICLE AND)	
		INSTALLATION THEREFOR)	
)	
Examiner	:	Unknown)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-captioned application, please amend the application as follows:

IN THE SPECIFICATION:

Applicant submits herewith a substitute specification in compliance with 37 C.F.R. § 1.125 (b) and (c). Please substitute this specification for the original specification. A redlined copy of the amendment showing the changes made from the English translation of the original specification is also enclosed. The substitute specification includes no new matter.

IN THE CLAIMS:

Please cancel Claims 1-17, without prejudice.

Please add new Claims 18-34 as follows:

Appl. No. : **Unknown**
Filed : **Herewith**

18. (New) A method of measuring a speed of a vehicle having an antenna and travelling on a track formed by two rails, the track being divided in track sections separated by electric joints, each electric joint including two tuning blocks and a predetermined length of a track section, each of the tuning blocks allowing power coupling between adjacent track sections, the method comprising:

detecting a first discontinuity in a current or voltage of a signal generated by the antenna when the vehicle passes a first tuning block of an electric joint ;

detecting a second discontinuity in a current or voltage of a signal generated by the antenna when the vehicle passes a second tuning block of the electric joint; and

using the detected discontinuities to measure the speed of the vehicle travelling on the track.

19. (New) The method of Claim 18, further comprising obtaining the first discontinuity when an axle of the vehicle passes at a level of the first tuning block, wherein the first tuning block is configured to operate at a first frequency.

20. (New) The method of Claim 19, further comprising exerting an electrical action at the first frequency of the first tuning block to obtain the second discontinuity.

21. (New) The method of Claim 20, wherein the second discontinuity is obtained by creating an electric or magnetic field in a vicinity of the second tuning block.

22. (New) The method of Claim 21, wherein the electric or magnetic field is generated through a current which is proportional to a current caused by a voltage injected into the first tuning block.

23. (New) The method of Claim 22, wherein the electric or magnetic field is generated by the current caused by said voltage.

24. (New) The method of Claim 20, wherein the electrical action is a voltage injected in series with a voltage at a second frequency of the second tuning block.

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26. (New) The method of Claim 20, wherein the electrical action is the injection of a current into a voltage generator of the second tuning block, and wherein the current travels around a loop arranged between the rails.

28. (New) The method of Claim 27, further comprising filtering said signal at the first frequency of the voltage injected into the first tuning block.

a first tuning block in an electric joint, the first tuning block being configured to be in communication with an antenna of the vehicle when the vehicle passes the first tuning block;

a second tuning block in the electric joint, the second tuning block being configured to be in communication with the antenna when the vehicle passes the second tuning block; and

a generator configured to generate at least two current or voltage discontinuities in a signal generated by the antenna when passing one of the tuning blocks of the electric joint.

30. (New) The installation of Claim 29, wherein the generator includes a loop arranged in proximity to the second tuning block, and a power supply for a current at a first frequency of the first tuning block.

31. (New) The installation of Claim 30, wherein the loop is arranged in series with the first tuning block.

Appl. No. : Unknown
 Filed : Herewith

32. (New) The installation of Claim 29, wherein the generator includes a voltage generator at the first frequency of the first tuning block connected in series with the second tuning block.

33. (New) The installation of Claim 29, wherein the generator includes of a current generator connected in parallel to the second tuning block via a loop arranged between the rails.

34. (New) The installation of Claim 29, wherein the antenna on board the vehicle is placed in front of a first axle of the vehicle along with a receiver circuit connected to the antenna and provided with a filter set at the first frequency.

REMARKS

The foregoing amendments are to more closely conform the application to U.S. practice. No new matter has been added. Entry of the amendments is respectfully requested.

Respectfully submitted,
 KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 10/29/01

By: [Signature]
 John M. Carson
 Registration No. 34,303
 Attorney of Record
 620 Newport Center Drive
 16th Floor
 Newport Beach, CA 92660
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VANM235.001APC

**METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND
INSTALLATION THEREFOR**

5

Background of the Invention

Field of the Invention

The present invention relates to a method for measuring the speed of a vehicle travelling on a track of railway type.

The present invention also relates to the installation for carrying out this method.

10

Description of the Related Art

15

Various systems for determining the speed of a train travelling on a track have already been proposed. In particular, it has been suggested to use a sensor present on an axle to determine the speed of the train travelling on the track. However, this speed is not always sufficiently precise, and in particular, it might not take account of a risk arising when the wheel skids for reasons such as the climatic conditions (frost or snow) or the presence of leaves on the rails.

20

It has also been proposed to place two or three sensors on different axles in order to obtain better precision. However, this remains insufficient from the point of view of the risk management.

25

It is also known practice to arrange beacons along railway tracks in order to measure the speed of the vehicle travelling on these tracks. In this case, beacons, which are arranged at known and fixed distances, emit a signal. The vehicle travelling close to this beacon detects, with the aid of an antenna, the passage over the first beacon and measures the time upto the passage of the second beacon. The speed is readily deduced from the known distance between the two beacons and the time taken by the vehicle to cover this distance. Nevertheless, the beacons are placed a relatively large distance apart and this amounts essentially to measuring the average speeds over the distance covered.

30

It has also been proposed in document WO97/12796 to use a calibrated beacon to determine the almost instantaneous speed of a vehicle passing in its vicinity. This beacon emits a magnetic field and, by means of an antenna placed under the vehicle,

this vehicle can detect the entry into and exit from this field of magnetic influence. The time taken by the vehicle to cross the field of magnetic influence is deduced therefrom, and the speed of the vehicle is thus calculated. This method has the drawback of needing to place beacons at regular distances along the tracks.

5 Moreover, it is known practice to organize a track into track sections known as "block-sections", which are separated by electric joints. An electric joint consists of two tuning blocks acting as the power coupling for the track sections adjacent to each tuning block and for the short length of track located between these two tuning blocks (15 to 30 metres). Usually, the first tuning block acts as an emitter at a given frequency while the
10 second tuning block acts as a receiver at another frequency. The functions of the electric joint are, firstly, to prevent the propagation of the signal from one track circuit to the adjacent track circuit and, secondly, to couple the emitter and the receiver with the track.

 It is already known practice to use an electric joint to detect the passage of a
15 train. Actually, on passage of the train axles, a short-circuit is created between the two rails via the train axles and thus enables the detection of the position of said train relative to the emitter from the change of current in the track. Specifically, it is observed that the current at the F1 frequency in the rail in front of the axle is high before the axle passes at the level of the emitter connection, and undergoes a strong discontinuity at the
20 moment the axle passes.

 The document GB-A-2 153 571 describes an example of a track circuit assembly that is particularly suitable for a short track circuit of less than 40 m in length, which may be used in underground railway transit systems.

 It is mentioned therein that an electrical short-circuit is produced between the
25 rails and that an AC signal control unit is connected approximately 6 metres later so as to tune the loop thus formed to the resonance, to the frequency of the selected track signal. The control units comprise a capacitor, the value of which is chosen so as to adjust the resonance, and a transformer, one coil of which is mounted in series with the capacitor, a track circuit signal emitter or receiver being connected via a second coil of
30 the transformer.

Summary of the Invention

The present invention aims to provide a solution which can offer the maximum security within the railway context of the term in measuring the speed of a vehicle travelling on a track of railway type.

5 More particularly, the present invention aims to propose a method which allows the average speed to be estimated independently of the error sources, due, for example, to skidding and to engagement of the axles, and which is based on the detection, when a train passes, of joints separating the various track circuits.

The present invention aims to propose a system which can dispense with the
10 installation of beacons along the tracks.

More particularly, the present invention aims to use already existing train-locating equipment which consists of track circuits with electric joints.

The present invention relates to a method for measuring the speed of a vehicle provided with an antenna and travelling on a track with two rails in the form of track sections known as "block-sections" separated by electric joints, each electric joint consisting of two tuning blocks and of the predetermined track section located between them, each of the tuning blocks allowing the power coupling for the adjacent track section acting as a block-section, characterized in that at least two discontinuities are detected in the current or voltage of the signal as seen by an antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks of the same electric joint, in order to measure the speed of the vehicle travelling on the track.

The first discontinuity is obtained when the axle passes at the level of the first tuning block for the frequency of this first tuning block.

25 The second discontinuity is obtained by exerting an electrical action at the frequency of the first tuning block. This second discontinuity is obtained by creating an electric or magnetic field in the area of the second tuning block. This electric or magnetic field is generated by means of a current which is proportional to the current emitted by the voltage injected into the first tuning block. This field is generated
30 directly by the current emitted by said voltage.

According to another embodiment, the electrical action is a voltage injected in

series with the voltage at the second frequency of the second tuning block. This voltage injected in series is proportional to that which is injected into the first tuning block.

According to another embodiment, the electrical action is the injection of a current into a voltage generator which is present in the second tuning block, this current travelling round a loop arranged between the rails, said current being proportional to the current emitted by the voltage injected into the first tuning block.

The signal detected by the antenna which is on board the vehicle travelling on the track is filtered at the frequency of the voltage injected into the first tuning block.

The present invention also relates to an installation for carrying out the method as described above, in which the track is organized in the form of block-sections separated by electric joints, each electric joint consisting of at least two tuning blocks and of the short track section located between them. This installation comprises means for generating at least two current or voltage discontinuities in the signal as seen by the antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks of the same electric joint.

Brief Description of the Drawings

Figure 1 represents the electric diagram equivalent of an electric joint.

Figure 2 represents the equivalent diagram of a track circuit between two electric
20 joints as described in Figure 1.

Figure 3 indicates the effect of the axles on the current in the rails in front of the axles before the axle passes.

Figure 4 indicates the effect of the axles on the current in the rails after the axle passes.

25 Figure 5 represents the diagram of the current in the rails in front of the axles according to the prior art.

Figures 6, 7 and 8 represent several different embodiments of the invention.

Figure 9 represents the diagram of the current in the rails in front of the axle according to the invention.

Detailed Description of the Preferred Embodiment

An electric joint as represented in Figure 1 comprises a first tuning block TU.F1 located on a first side (left), which will serve as an emitter in order to generate a voltage in the track at the frequency F1 and allows the power coupling of this first side (left) of the track adjacent to the tuning block. A second tuning block TU.F3, located at a distance of 15 to 30 metres, allows the power coupling of the other part of the track (right) adjacent to this tuning block. This second tuning block serves as a receiver for a frequency F3. It might optionally also act as an emitter, which would allow a voltage to be generated at the frequency F3.

Figure 2 represents a track circuit comprising several track sections organized into block-sections and separated by electric joints, each consisting of two tuning blocks coupled in pairs. For a frequency F1, the two tuning blocks TU.F1 and TU.F1' are equivalent to a capacity which performs the tuning of the track section (block-section 1) comprised between these two blocks, while the two tuning blocks TU.F3 and TU.F3' are equivalent to short-circuits at this same frequency (F1). At the frequency (F3) of the adjacent track circuits, the function of the tuning blocks is then inverted.

As represented in Figures 3 and 4, a shunt or short-circuit is created between the rails 1 and 2 when the axle 3 passes. More specifically, the behaviour of the current I generated at the frequency F1 and present in the track 1 in front of the axle 3 is modified.

As shown in Figure 5, it is observed that the current I at the frequency F1 remains high up to the moment at which the axle approaches the emitter TU.F1 which generates the signal at the frequency F1. At the level of said emitter, it is observed that the current I at the frequency F1 falls suddenly, creating a first discontinuity 7 at that point. Figure 5 shows in details the behaviour of the current I in front of the axle, taking into account the position of the emitter TU.F1 on the x-axis serving as reference, whereas TU.F3 is situated at 18m.

The present invention consists in creating a second discontinuity 8 in the immediate vicinity of the second tuning block TU.F3 and in using these two discontinuities occurring at a known distance in order to be able to calculate the average speed of the train between the two positions at which said discontinuities occur.

To this end, it is envisaged to detect on board the train a signal resulting from the magnetic field generated by the current I. More specifically, the voltage V obtained by filtering the antenna signals in a known manner will be proportional to the current I present in the rails in front of the axle 3. This signal is caught by at least one antenna of known type arranged upstream the first axle 3. The signal is filtered at the frequency F1 in order to allow the detection of the two discontinuities 7 and 8 of the current I. One or more other signals at the frequency F3 or at other frequencies may also be used for detecting other pairs of discontinuities occurring on other track circuits.

According to a first embodiment of the present invention, which is more particularly represented in Figure 6, it is suggested to arrange a loop 4 between the rails 1 and 2 close to the block TU.F3 acting as receiver and equivalent to a short-circuit at the frequency F3. This loop 4 is supplied with a current at the frequency F1 which is preferably proportional to the current in the block TU.F1. It is preferably connected in series with this block. Advantageously, the magnetic field generated by the loop 4 creates the second discontinuity 8 required to carry out the method according to the present invention. According to another preferred embodiment of the invention, which is more particularly represented in Figure 7, it is proposed to connect a voltage generator 5 at the frequency F1 in series with the block TU.F3. In this case, the block TU.F3 is equivalent to a short-circuit for the frequency F1. The generator 5 is preferably supplied from the power supply for the block TU.F1.

The second discontinuity 8 will be obtained during passage at the block TU.F3 (x-axis = 18m), the voltage being proportional to that of the block TU.F1 (emitter at the frequency F1).

According to another embodiment, represented in Figure 8, a current generator 6 is connected in parallel to the terminals of the block TU.F3. The current thus generated travels round the loop 9 arranged between the two rails 1 and 2, thus creating a magnetic field that is detectable at that point. The generator 6 at the frequency F1 is advantageously arranged in series with the block TU.F1 and thus creates the second desired discontinuity 8.

Figure 9 shows the current I as a function of the distance travelled on the rails by positioning the block TU.F1 creating the first discontinuity at 0 and the block TU.F3

creating the second discontinuity at 18m. One may detect a signal on board by filtering the antenna signals at the frequency F1 and detect the presence of the two discontinuities 7 and 8 whose descending slopes are linked to the precise position of the blocks TU.F1 and TU.F3.

5 Conventionally, the detection of these two detected discontinuities will be processed using a microprocessor, which makes it possible to define the time interval between the detection of said discontinuities. Conventionally, knowledge of the precise distance between the blocks TU.F1 and TU.F3 will make it possible to calculate the average speed of the vehicle travelling on said track between the two blocks TU.F1 and
10 TU.F3.

In a particularly advantageous manner, it is observed that the cost of installation of the additional device is relatively low and thus makes it possible to obtain a relatively precise measurement of the speed of the train travelling on a track. In addition, the measurement of this speed remains independent of the precise positioning of beacons,
15 for example, the movement of which might occur in the event of maintenance work on the track, climatic phenomena, skidding of the wheels, etc.

WHAT IS CLAIMED IS:

1. Method for measuring the speed of a vehicle provided with an antenna and travelling on a track with two rails in the form of track sections known as "block-sections" (1,2,3) separated by electric joints, each electric joint consisting of two tuning blocks (TU.F1 and TU.F3) and of the predetermined track section located between them, each of the tuning blocks allowing the power coupling for the adjacent track section serving as a block-section, characterized in that at least two discontinuities are detected in the current or voltage of the signal seen by an antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks (TU.F1 and TU.F3) of a same electric joint, in order to measure the speed of the vehicle travelling on the track.
2. Method according to Claim 1, characterized in that the first discontinuity is obtained when the axle passes at the level of the first tuning block for the frequency (F1) of this first tuning block (TU.F1).
3. Method according to Claim 1 or 2, characterized in that the second discontinuity is obtained by exerting an electrical action at the frequency (F1) of the first tuning block (TU.F1).
4. Method according to Claim 3, characterized in that the second discontinuity is obtained by creating an electric or magnetic field in the vicinity of the second tuning block (TU.F3).
5. Method according to any one of the preceding claims, characterized in that the electric or magnetic field is generated by means of a current which is proportional to the current emitted by the voltage injected into the first tuning block (TU.F1).
6. Method according to Claim 5, characterized in that the field is generated by the current emitted by said voltage.
7. Method according to any one of Claims 1 to 3, characterized in that the electrical action is a voltage injected in series with the voltage at the second frequency (F3) of the second tuning block (TU.F3).
8. Method according to Claim 7, characterized in that the voltage injected in series is proportional to the one which is injected into the first tuning block (TU.F1).

9. Method according to any one of Claims 1 to 3, characterized in that the electrical action is the injection of a current into a voltage generator (TU.F3) which is present in the second tuning block, and in that this current travels around a loop arranged between the rails.

5 10. Method according to Claim 9, characterized in that said current is proportional to the current emitted by the voltage injected into the first tuning block (TU.F1).

11. Method according to Claim 10, characterized in that said signal is filtered at the frequency (F1) of the voltage injected into the first tuning block (TU.F1).

10 12. Installation for carrying out the method according to any one of the preceding claims, in which the track is organized in the form of block-sections separated by electric joints, each electric joint consisting of at least two tuning blocks (TU.F1 and TU.F3) and of the short track section located between them, characterized in that means are provided for generating at least two current or voltage discontinuities in the signal as
15 seen by the antenna which is present in the vehicle travelling on the track in the immediate vicinity of the first and second tuning blocks (TU.F1 and TU.F3) of a same electric joint.

13. Installation according to Claim 12, characterized in that said device consists of a loop (4) arranged close to the second tuning block (TU.F3) and provided
20 with a power supply by a current at the frequency (F1) of the first tuning block (TU.F1).

14. Installation according to Claim 13, characterized in that the loop (4) is arranged in series with the emitter of the first tuning block (TU.F1).

15. Installation according to Claim 12, characterized in that said device is a voltage generator (5) at the frequency of the emitter of the first tuning block (TU.F1)
25 connected in series with the emitter of the second tuning block (TU.F3).

16. Installation according to Claim 12, characterized in that said device is a current generator (6) connected in parallel to the emitter of the second tuning block (TU.F3) via a loop arranged between the rails.

17. Installation according to any one of Claims 12 to 16, characterized in that
30 an antenna on board the vehicle is placed in front of the first axle (3) along with a

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receiver circuit connected to the antenna and provided with a filter set at the frequency F1.

METHOD FOR MEASURING THE SPEED OF A RAIL VEHICLE AND INSTALLATION THEREFOR

Abstract of the Disclosure

5 In order to measure a speed of a vehicle having an antenna and travelling on a track formed by two rails, first and second discontinuities are detected. The first discontinuity is detected in a current or voltage of a signal generated by an antenna when the vehicle passes a first tuning block of an electric joint. The second discontinuity is detected in a current or voltage of a signal generated by the antenna when the vehicle passes a second tuning block of the electric joint. The detected
10 discontinuities are used to measure the speed of the vehicle travelling on a track divided in track sections separated by electric joints. Each electric joint includes two tuning blocks and a predetermined length of a track section, wherein each of the tuning blocks allows power coupling between adjacent track sections.

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Declaration and Power of Attorney for Patent Application

Déclaration et Pouvoirs pour demandes de brevet

French Language Declaration

En tant que l'inventeur nommé ci-après, je déclare par le présent acte que :

Mon domicile, mon adresse postale et ma nationalité figurant ci-dessous à côté de mon nom,

Je crois être le premier inventeur original et unique (si un seul nom est mentionné ci-dessous), ou l'un des premiers co-inventeurs originaux (si plusieurs noms sont mentionnés ci-dessous) du sujet revendiqué, pour lequel une demande de brevet a été déposée concernant l'invention intitulée :

et dont les caractéristiques sont fournies ci-joint à moins que la case suivante n'ait été cochée :

- ☐ a été déposé le
sous le numéro de Demande des Etats-Unis ou
sous le numéro de demande internationale
PCT et modifiée le
(le cas échéant).

Je déclare par le présent acte avoir passé en revue et pris connaissance du contenu des caractéristiques ci-dessus, revendications comprises, telles que modifiées par tout amendement dont il aura été fait référence ci-dessus.

Je reconnais de voir divulguer toute information pertinente à l'examen de cette demande, comme le définit le Titre 37, §1.56 du Code fédéral des réglementations.

As a below named inventor, I hereby declare that :

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled :

the specification of which is attached hereto unless the following box is checked :

- ☒ was filed on 20 April 2000
as United States Application Number or PCT
International Application Number
PCT/BE00/00043 and was amended on
(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

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French Language Declaration

Je revendique par le présent acte avoir la priorité étrangère, en vertu du Titre 35, § 119 du Code des Etats-Unis, sur toute demande étrangère de brevet ou certificat d'inventeur figurant ci-dessous et ai aussi pris connaissance de toute demande étrangère de brevet ou de tout certificat d'inventeur ayant une date de dépôt précédant celle de la demande à propos de laquelle une priorité est revendiquée.

Prior foreign applications

Demande(s) de brevet antérieure(s)

EP 99870079.3 EP
(Number) (Country)
(Numéro) (Pays)

(Number) (Country)
(Numéro) (Pays)

(Number) (Country)
(Numéro) (Pays)

Je revendique par le présent acte tout bénéfice, en vertu du Titre 35, § 120 du Code des Etats-Unis, de toute demande de brevet effectuée aux Etats-Unis figurant ci-dessous et, dans la mesure où le sujet de chacune des revendications de cette demande de brevet n'est pas divulgué dans la demande américaine préalable, en vertu des dispositions de premier paragraphe du Titre 35, § 112 du Code des Etats-Unis, je reconnais devoir divulguer toute information pertinente à la demande de brevet comme défini dans le Titre 37, § 1.56 du Code fédéral des réglementations, dont j'ai pu disposer entre la date de dépôt de la première demande et la date de dépôt de la demande nationale ou PCT internationale :

(Application Serial No.) (Filing date)
(No. de série de la demande) (Date de dépôt)

(Application Serial No.) (Filing date)
(No. de série de la demande) (Date de dépôt)

Je déclare par le présent acte que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique; et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des Etats-Unis et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci.

I hereby claim foreign priority under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Priority claimed Droit de priorité revendiqué

30 April 1999	<input checked="" type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non
	<input type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non
	<input type="radio"/>	<input type="radio"/>
(Day/Month/Year Filed)	Yes	No
(Jour/Mois/Année de dépôt)	Oui	Non

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application :

(Statut) (Status)
(Breveté, en attente, annulé) (Patented, pending, abandoned)

(Statut) (Status)
(Breveté, en attente, annulé) (Patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful and false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon

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French Language Declaration

POUVOIRS : En tant que l'inventeur cité, je désigne par la présente l'(les) avocat(s) et/ou agent(s) suivant(s) pour qu'il(s) poursuive(nt) la procédure de cette demande de brevet et traite(nt) toute affaire avec le Bureau des brevets et marques s'y rapportant.

(mentionner le nom et le numéro d'enregistrement)

POWER OF ATTORNEY : As named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and trademark Office connected there with.

(list name and registration number)

Adresser toute correspondance à :

Send Correspondence to :

Adresser tout appel téléphonique à :
(nom et numéro de téléphone)

Direct Telephone Calls to :
(name and telephone number)

Nom complet de l'unique ou premier inventeur <i>1-00</i>	Full name of sole or first inventor LECHEVIN Eric
Signature de l'inventeur Date	Inventor's signature Date <i>5 DEC. 2002</i>
Domicile	Residence Chemin de Motte à Faulx 3c, B-7900 LEUZE-EN-HAINAUT (Belgium) <i>BEX</i>
Nationalité	Citizenship Belgian citizen
Adresse postale	Post Office Address Chemin de Motte à Faulx 3c, B 7900 LEUZE-EN-HAINAUT (Belgium)

(Fournir les mêmes renseignements et la signature de tout co-inventeur supplémentaire)

(Supply similar information and signature for any subsequent joint inventor)

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Nom complet du second co-inventeur, le cas échéant <i>2nd</i>	Full name of second joint inventor, if any FRANCKART Jean-Pierre
Signature du second inventeur Date	Second inventor's signature Date <i>5 DEC. 2001</i>
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Adresse postale	Post Office Address Chaussée de Charleroi 76, B-6060 MONTIGNIES-SUR-SAMBRE (Belgium)

Nom complet du troisième co-inventeur, le cas échéant <i>3rd</i>	Full name of third joint inventor, if any GALARDINI Danièle
Signature du troisième inventeur Date	Third inventor's signature Date <i>5 DEC. 2001</i>
Domicile	Residence Avenue Jules Destrée 62, B-6031 MONCEAU-SUR-SAMBRE (Belgium) <i>BEX</i>
Nationalité	Citizenship Belgian citizen
Adresse postale	Post Office Address Avenue Jules Destrée 62, B-6031 MONCEAU-SUR-SAMBRE (Belgium)

Nom complet du quatrième co-inventeur, le cas échéant	Full name of fourth joint inventor, if any
Signature du quatrième inventeur Date	Fourth inventor's signature Date
Domicile	Residence
Nationalité	Citizenship
Adresse postale	Post Office Address

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